AMENDMENTS TO THE CLAIMS

1.   (Currently Amended)   A layered network node which is provided in a network consisting of one or a plurality of layers, comprising:

[[a]]means for mutually interchanging with other nodes information about the present node and links which are connected to the present node (hereinafter termed "link state information");

[[a]]means for storing link state information for one or for all of the nodes within said network which has been obtained by this interchanging means;

[[a]]means for selecting a path for an LSP of one or a plurality of types of layer, based upon link state information which has been stored in said storing means according to an LSP establishment request; and

[[a]]means for changing the path which has been selected and established by this selection means, according to an LSP change request, based upon link state information which has been stored in said storing means[[;]]‚

wherein the network to which said node belongs is a layered network‚ which is built up by: dividing up into cells which are constituted by a plurality of nodes; defining these cells as virtual nodes; the layered network comprises virtual networks of a plurality of levels, each of the virtual networks belonging to each level comprises one or a plurality of virtual nodes belonging to the each level, each of the virtual nodes serves as a cell, each cell comprises one or a plurality of nodes, a virtual node in a virtual network belonging to a lower level, which is a level other than the highest level, is a node in a virtual network belonging to a level higher than the lower level, and if links exist which connect the interiors of the virtual nodes and the exterior, defining the contact points between these interiors of the virtual nodes and the exterior [[as]]are interfaces of the virtual nodes; further dividing up the virtual network which has been

~~constituted by the virtual nodes into cells; making them into virtual nodes; further dividing them up into cells; the virtual network which has been made into virtual nodes is defined as a network of a higher level with respect to the initial virtual network; and by performing the above described operation of division into cells and making into virtual nodes once or a plurality of times;~~ِ

and <u>the layered network node further</u> compris<u>es</u>[[ing]] a link state database which accumulates link state information which is advertised from other nodes within [[the]]<u>a</u> virtual node to which self node belongs or from other virtual nodes[[;]]ِ

and the nodes which fulfill a function of interfacing with nodes within the virtual node or with the exterior of the virtual node are defined as border nodes,

and <u>the layered network node further</u> comprises: a link state abstraction section comprising [[a]] means for, when the present node is positioned at this border node, creating interface information for the exterior of the virtual node based upon link state information interior to the virtual node; and

an advertisement section which advertises said interface information which has been created to the exterior of the virtual node.

2.   (Currently Amended) The layered network node according to Claim 1, further comprising [[a]] means for recognizing a link group, among a plurality of links which mutually connect virtual nodes together, which connects between the same virtual node; and

[[a]]processing means for treating the links which are included within the link group which has been recognized by this recognition means as a single virtual link.

3.   (Currently Amended)   The layered network node according to Claim 1, further comprising:

[[a]]means for recognizing a first link group, among a plurality of which mutually connect virtual nodes together, which connects between the same virtual node;

[[a]]means for further classifying the first link group which has been recognized by said recognition means into second link groups which possess the same switching capability;

and [[a]] processing means for treating the links which are included within the second link group which has been classified by said classification means as a single virtual link.

4.   (Currently Amended)   The layered network node according to Claim 1, wherein said link state abstraction section comprises [[a]] switching capability allotment means for performing allotment of the switching capability within the virtual node to which the present node belongs by a link which is connected to the present node to a link which corresponds to an interface which connects the virtual node and moreover to which the present node belongs and the exterior;

and said interface information is information about the switching capability which has been allotted to said interfaces by said switching capability allotment means.

5.   (Currently Amended)   The layered network node according to Claim 1, wherein said link state abstraction section comprises:

[[a]]switching capability allotment means for performing allotment of the switching capability within the virtual node to which the present node belongs by a link

which is connected to the present node to a link which corresponds to an interface which connects the virtual node to which the present node belongs and the exterior;

and [[a]] cost allotment means for allotting a transmission cost to each switching capability which has been allotted by said switching capability allotment means;

and said interface information is information about the switching capability which has been allotted to said interfaces by said switching capability allotment means, and information about the transmission costs which have been allocated to the switching capabilities of said interfaces by said cost allotment means.

6.   (Previously Presented) The layered network node according to Claim 4 or Claim 5, wherein said information about the switching capability which has been allotted to said interfaces is created in correspondence with each layer of an LSP which can be established between the present node as a border node or a virtual border node, and another border node or another virtual border node which belongs within the same virtual node.

7.   (Previously Presented) The layered network node according to Claim 4 or Claim 5, wherein said information about the switching capability which has been allotted to said interfaces is information which is related to the switching capability of a border node or a virtual border node to which the link which constitutes said interface is directly connected.

8.   (Currently Amended) The layered network node according to Claim 1, wherein said advertisement section comprises [[a]] means for performing an

advertisement to the exterior of the virtual node each time a change in switching capability of said border node occurs.

9.   (Currently Amended) The layered network node according to Claim 1, wherein said advertisement section comprises [[a]] means for performing an advertisement to the exterior of the virtual node at a fixed interval.

10.   (Previously Presented) The layered network node according to Claim 5, wherein said information about transmission cost is generated as the reciprocal of the total number of interfaces which are not in use to which switching capability of said layer which is included in the virtual node is allotted.

11.   (Previously Presented) The layered network node according to Claim 5, wherein said information about transmission cost is generated, in relation to the number of interfaces to which switching capability of said layer which is included in the virtual node is allotted which are in use, and the total number of interfaces, as the number of interfaces in use divided by the total number of interfaces.

12.   (Previously Presented) The layered network node according to Claim 5, wherein said information about transmission cost, between a border node within the virtual node and another border node which belongs to the same border node as said border node, is information which is determined for each layer of the LSP which is established as the cost when establishing a LSP of any layer.

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13. (Currently Amended) The layered network node according to Claim 12, wherein said cost allotment means ~~comprises a~~ <u>comprise</u> means for calculating a cost value of the path for which the value, which is obtained by adding, along the path when establishing an LSP between a border node within the virtual node and another border node which belongs to the same border node as said border node, the link cost of the link and the node cost of the node or the virtual node, becomes minimum.

14. (Currently Amended) The layered network node according to Claim 12, wherein said cost is the value which is obtained by adding the link cost of the link and the node cost of the node or the virtual node along the path of the minimum number of hops which is established between a border node within the virtual node and another border node which belongs to the same border node as said border node;

and comprising [[a]] means for, if there exists a plurality of said paths of the minimum number of hops, selecting from among cost value candidates which are aggregates of a plurality of values which are obtained by said addition, as the cost value, that one for which its value becomes minimum.

15. (Previously Presented) The layered network node according to Claim 13 or Claim 14, wherein said value which is obtained by said addition is the reciprocal of the number of interfaces which are not in use to which switching capability of said layer which is included in the virtual nodes along said path is allotted.

16. (Previously Presented) The layered network node according to Claim 13 or Claim 14, wherein said value which is obtained by said addition is given, in relation to the number of interfaces to which switching capability of said layer which is included in

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the nodes along said path is allotted which are in use, and the total number of interfaces, by the number of interfaces used divided by the total number of interfaces.

17. (Currently Amended) The layered network node according to Claim 5 or Claim 12, wherein a node which corresponds to an interface of a virtual node comprises [[a]] means for computing information about said transmission cost, or said cost, based upon said link state information at a time interval which is fixed in advance.

18. (Currently Amended) The layered network node according to Claim 5 or Claim 12, wherein a node which corresponds to an interface of a virtual node comprises [[a]] means for computing information about said transmission cost, or said cost, based upon said link state information, whenever change of the utilization state of the interface within the virtual node is notified by advertisement of link state information and the utilization state of the interface changes.

19. (Previously Presented) The network comprising a layered network node according to Claim 1.

20. (Original) A method for layered path selection when establishing an LSP of any layer within a network which comprises a layered network node according to Claim 1, in which procedures are executed of:

when selecting a path from a source node to a destination node, deciding, by referring to said link state database of the lowest level 1, whether or not, among said

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virtual nodes of level 1, the destination node is present within a virtual node which includes the source node;

if the source node and the destination node are not present within the same virtual node, deciding, by referring to said link state database of the next higher level 2, whether or not the destination node is present within a virtual node of said level 2 which includes the source node;

by repeating this decision until the source node and the destination node are included within the same virtual node, selecting a virtual node of a level N (where N is a natural number) which includes both the source node and the destination node;

when selecting a path of level N from the source node to the destination node within self virtual node of level N which has been selected, selecting the path selection of a virtual node group which is included within said virtual node of level N which has been selected by said selection means of said level N based upon said link state database of level N;

when further selecting a path of the next lowest level (N-1) from the source node to the destination node from among the virtual nodes which are included in this path of level N which has been selected, selecting by said selection means of said level (N-1) based upon said link state database of the next lowest level (N-1) than said virtual node which has been selected; and

by repeating this until the lowest level 1, selecting a path from the source node to the destination node.

21.   (Original) A method for layered path selection when establishing an LSP of any layer within a network which comprises a layered network node according to Claim 1, in which procedures are executed of:

when selecting a path from a source node to a destination node, in a network which is made up from virtual nodes of a topmost level N, deciding, by referring to said link state database of said level N, whether or not the source node and the destination node are present within the same virtual node;

if the source node and the destination node are present within the same virtual node, deciding, by referring to said link state database of the next lower level (N-1) within self virtual node, whether or not the source node and the destination node are present within the same virtual node in the network of the next lower level (N-1) within self virtual node;

selecting a virtual node of the level (N-k) which includes both the source node and the destination node, by repeating this decision until the source node and the destination node are included within different virtual nodes, and selecting the virtual node of the next highest level (N-k) thereto (where k is a natural number);

when selecting a path of level (N-k) from the source node to the destination node within self virtual node, selecting the path selection of a virtual node group which is included within said virtual node of level (N-k) which has been selected by said selection means of said level (N-k) based upon said link state database of said level (N-k);

when further selecting a path of the next lowest level (N-k-1) from the source node to the destination node from among the virtual nodes which are included in this path of level (N-k) which has been selected, selecting by said selection means of said level (N-k-1) based upon said link state database of the next lowest level (N-k-1) than said virtual node which has been selected; and

by repeating this until the lowest level 1, selecting a path from the source node to the destination node.

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22.   (Previously Presented)   The layered path selection method according to Claim 20 or Claim 21, wherein, for a virtual node of a lower level than the level which includes both said source node and said destination node, the computation for selecting the path within the present node is performed by that border node, among the border nodes which are included within self virtual node, which is allotted as an input-output interface of said path.

23.   (Previously Presented)   The layered path selection method according to Claim 20 or Claim 21, wherein, for a virtual node of a lower level than the level which includes both said source node and said destination node, the computation for selecting the path within the present node is performed by that border node, among the border nodes which are included within self virtual node, which is determined in advance as a representative node.

24.   (Currently Amended)   A computer-readable storage medium storing encoded with a program having computer-executable instructions when executed by a processor which, by being installed upon an information processing device, causes said information processing device, when establishing an LSP of any layer within a network which comprises a layered network node according to Claim 1, to execute procedures of:

when selecting a path from a source node to a destination node, deciding, by referring to said link state database of the lowest level 1, whether or not, among said virtual nodes of level 1, the destination node is present within a virtual node which includes the source node;

if the source node and the destination node are not present within the same virtual node, deciding, by referring to said link state database of the next higher level 2,

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whether or not the destination node is present within a virtual node of said level 2 which includes the source node;

by repeating this decision until the source node and the destination node are included within the same virtual node, selecting a virtual node of a level N (where N is a natural number) which includes both the source node and the destination node;

when selecting a path of level N from the source node to the destination node within self virtual node of level N which has been selected, selecting the path selection of a virtual node group which is included within said virtual node of level N which has been selected by said selection means of said level N based upon said link state database of level N;

when further selecting a path of the next lowest level (N-1) from the source node to the destination node from among the virtual nodes which are included in this path of level N which has been selected, selecting by said selection means of said level (N-1) based upon said link state database of the next lowest level (N-1) than said virtual node which has been selected; and

by repeating this until the lowest level 1, selecting a path from the source node to the destination node.

25.   (Currently Amended)   A computer-readable <u>storage</u> medium <u>storing</u> ~~encoded with~~ a program <u>having computer-executable instructions when executed by a processor</u>~~which, by being installed upon an information processing device, causes said information processing device~~, when establishing an LSP of any layer within a network which comprises a layered network node according to Claim 1, to execute procedures of:

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when selecting a path from a source node to a destination node, in a network which is made up from virtual nodes of a topmost level N, deciding, by referring to said link state database of said level N, whether or not the source node and the destination node are present within the same virtual node;

if the source node and the destination node are present within the same virtual node, deciding, by referring to said link state database of the next lower level (N-1) within self virtual node, whether or not the source node and the destination node are present within the same virtual node in the network of the next lower level (N-1) within self virtual node;

selecting a virtual node of the level (N-k) which includes both the source node and the destination node, by repeating this decision until the source node and the destination node are included within different virtual nodes, and selecting the virtual node of the next highest level (N-k) thereto (where k is a natural number);

when selecting a path of level (N-k) from the source node to the destination node within self virtual node, selecting the path selection of a virtual node group which is included within said virtual node of level (N-k) which has been selected by said selection means of said level (N-k) based upon said link state database of said level (N-k);

when further selecting a path of the next lowest level (N-k-1) from the source node to the destination node from among the virtual nodes which are included in this path of level (N-k) which has been selected, selecting by said selection means of said level (N-k-1) based upon said link state database of the next lowest level (N-k-1) than said virtual node which has been selected; and

by repeating this until the lowest level 1, selecting a path from the source node to the destination node.

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26.   (Cancelled)

27.   (Currently Amended) A node which constitutes a virtual node of level 1 in a layered network~~,which has been defined by dividing up the nodes which make up the network into cells each made up from one or a plurality of said nodes and defining these cells as virtual nodes of level 1, so that these virtual nodes of level 1 constitute a virtual network of level 1, further dividing up these virtual nodes of level 1 which constitute said virtual network of level 1 into cells which are constituted by one or a plurality of virtual nodes, so as to constitute virtual nodes of level 2, and constituting a layered network by virtual networks of levels 1 through N which have been built up by performing the process of dividing into cells and making into virtual nodes in this manner once or a plurality N of times, and by,~~ <u>the layered network comprising virtual networks of a plurality of levels 1 through N, each of the virtual networks belonging to each level comprising one or a plurality of virtual nodes belonging to the each level, each of the virtual nodes serving as a cell, each cell comprising one or a plurality of nodes, a virtual node in a virtual network belonging to a lower level, which is a level other than the highest level, being a node in a virtual network belonging to a level higher than the lower level,</u> if a link exists in said layered network which connects between different virtual nodes of the same level or of different levels, ~~defining~~ a node which corresponds to the point of contact between the interior of the virtual node upon this link and the exterior <u>being</u> [[as]] an interface, ~~so that,~~ <u>and</u> when the highest level virtual node to which said interface is related is of level M [[(]]where M[[(]]≤N[[)]], said interface serv<u>ing</u>[[es]] as a plurality of hierarchical interfaces of level 1 through level M, comprising:

[[a—]]means for advertising to an other node within self virtual node link information about a link which has been connected to self node and link cost information for said link;

[[a]]means for receiving, from an other node within self virtual node, said advertisement of link information within self virtual node and link cost information for said link, and storing said information; and

[[a]]means for receiving, from a node which corresponds to said interface within self virtual node, said advertisement of link information between said node and a node which corresponds to an interface with a virtual node of level 2 or greater, and link cost information for said link, and storing said information.

28.   (Currently Amended) The node according to Claim 27, further comprising:

[[a]]means for transmitting its own IP address to a node which corresponds to an interface of self virtual node; and

[[a]]means for storing external IP address group information, which is information about an IP address of an other node which belongs to a virtual node other than self virtual node, and about the virtual node to which said IP address belongs, which have been transmitted from the node which corresponds to said interface.

29.   (Currently Amended) The node according to Claim 27, further comprising:

[[a]]means for transmitting its own IP address to a node which corresponds to an interface of self virtual node; and

[[a]]means for requesting and obtaining, from the node which corresponds to said interface, external IP address group information, which is information about an IP address of an other node which belongs to a virtual node other than self virtual node, and about the virtual node to which said IP address belongs.

30.   (Currently Amended) The node according to Claim 27, further comprising:

[[a]]means for transmitting its own IP address and link cost information between itself and a node which corresponds to an interface with self virtual node to the node which corresponds to said interface; and

[[a]]means for storing external IP address group information, which is information about an IP address of an other node which belongs to a virtual node other than self virtual node, and about the virtual node to which said IP address belongs, which has been transmitted from the node which corresponds to said interface, and link cost information from the node which corresponds to said interface to said other node, in correspondence to the IP address of said other node.

31.   (Currently Amended) The node according to Claim 27, further comprising:

[[a]]means for transmitting its own IP address and link cost information between itself and a node which corresponds to an interface with self virtual node to the node which corresponds to said interface; and

[[a]]means for requesting and obtaining, from the node which corresponds to said interface, designates the IP address of said other node, external IP address group information, which is information about an IP address of an other node which belongs to a virtual node other than self virtual node, and about the virtual node to which said IP address belongs, and link cost information from the node which corresponds to said interface to said other node.

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32.   (Currently Amended) The node according to Claim 27, further comprising [[a]] means for dispatching a packet for checking reachability to the node which corresponds to said interface of self virtual node.

33.   (Currently Amended) The node according to Claim 32, further comprising [[a]] means for computing respective link costs for nodes which correspond to a plurality of said interfaces of said virtual node, wherein said dispatching means comprise[[s a]] means for dispatching a packet for checking reachability to the node which corresponds to said interface for which the link cost is the least, according to the results of computation by this computation means.

34.   (Currently Amended) The node according to Claim 32, further comprising [[a]] means for computing respective link costs for nodes which correspond to a plurality of said interfaces of said virtual node, wherein said dispatching means comprise[[s a]] means for dispatching packets for checking reachability to the nodes which correspond to said interfaces for which the link cost, according to the results of computation by this computation means, is the smallest in order until the nth, where n is a natural number.

35.   (Currently Amended) The node according to Claim 32, further comprising [[a]] means for computing respective link costs for nodes which correspond to a plurality of said interfaces of said virtual node, wherein said dispatching means comprise[[s a]] means for dispatching packets for checking reachability to the nodes which correspond to said interfaces for which the link cost, according to the results of computation by this computation means, is the smallest in order until the nth (where n is a natural number), said packets including information about said order.

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36. (Currently Amended) A node which constitutes a virtual node of level 1 in a layered network, ~~which has been defined by dividing up the nodes which make up the network into cells each made up from one or a plurality of said nodes and defining these cells as virtual nodes of level 1, so that these virtual nodes of level 1 constitute a virtual network of level 1, further dividing up these virtual nodes of level 1 which constitute said virtual network of level 1 into cells which are constituted by one or a plurality of virtual nodes, so as to constitute virtual nodes of level 2, and constituting a layered network by virtual networks of levels 1 through N which have been built up by performing the process of dividing into cells and making into virtual nodes in this manner once or a plurality of times, and by,~~ the layered network comprising virtual networks of a plurality of levels 1 through N, each of the virtual networks belonging to each level comprising one or a plurality of virtual nodes belonging to the each level, each of the virtual nodes serving as a cell, each cell comprising one or a plurality of nodes, a virtual node in a virtual network belonging to a lower level, which is a level other than the highest level, being a node in a virtual network belonging to a level higher than the lower level, if a link exists in said layered network which connects between different virtual nodes of the same level or of different levels, ~~defining~~ a node which corresponds to the point of contact between the interior of the virtual node upon this link and the exterior being [[as]] an interface, ~~so that,~~ and when the highest level virtual node to which said interface is related is of level M [[(]]where M[[(]]$\leq$N[[)]], said interface serving[[es]] as a plurality of hierarchical interfaces of level 1 through level [[N]]M, comprising:

[[a]]means for advertising link information about a link which has been connected to self node to an other node within self virtual node and link cost information for said link; and

[[a-]]means for receiving said advertisement of link information within self virtual node and link cost information for said link from an other node within self virtual node, and storing said information.

37.   (Currently Amended) The node according to Claim 36, further comprising [[a]] means for, ahead of path computation, requesting and obtaining, from said node which corresponds to said interface, link information between a node which corresponds to the interface with self virtual node and a node which corresponds to an interface with a virtual node of level 2 or higher, and link cost information for said link.

38.   (Currently Amended) A node which constitutes a virtual node of level 1 in a layered network, which has been defined by dividing up the nodes which make up the network into cells each made up from one or a plurality of said nodes and defining these cells as virtual nodes of level 1, so that these virtual nodes of level 1 constitute a virtual network of level 1, further dividing up these virtual nodes of level 1 which constitute said virtual network of level 1 into cells which are constituted by one or a plurality of virtual nodes, so as to constitute virtual nodes of level 2, and constituting a layered network by virtual networks of levels 1 through N which have been built up by performing the process of dividing into cells and making into virtual nodes in this manner once or a plurality of times, and by, the layered network comprising virtual networks of a plurality of levels 1 through N, each of the virtual networks belonging to each level comprising one or a plurality of virtual nodes belonging to the each level, each of the virtual nodes serving as a cell, each cell comprising one or a plurality of nodes, a virtual node in a virtual network belonging to a lower level, which is a level other than the highest level, being a node in a virtual network belonging to a level higher than the lower level, if a link exists in said layered network which connects between different virtual nodes of the same level or of different levels, defining a node which corresponds to the point of

contact between the interior of the virtual node upon this link and the exterior being [[as]] an interface, so that, and when the highest level virtual node to which said interface is related is of level M [[(]]where M≤N[[)]], said interface serving[[es]] as a plurality of hierarchical interfaces of level 1 through level [[N]]M, comprising, if self node itself corresponds to said interface:

[[a]]means for advertising to an other node within self virtual node link information about a link within self virtual node which has been connected to self node and link cost information for said link, and link information for a link with a node which corresponds to an interface of another virtual node which has been connected to self node, and link cost information for said link;

[[a]]means for receiving, from an other node within self virtual node, said advertisement of link information within self virtual node and link cost information for said link, and storing said information; and

[[a]]means for receiving, from a node which corresponds to said interface with another virtual node, advertisement of link information with a node which corresponds to said interface of a higher level, and link cost information for said link, and storing said information.

39.   (Currently Amended) The node according to Claim 38, further comprising:

[[a]]means for gathering together and storing IP address information from other nodes within self virtual node;

[[a]]means for advertising the IP address information which has been gathered together by this gathering together and storing means to a node which corresponds to an interface of another virtual node; and

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[[a]]means for storing external IP address information, which is information about the IP address of another node which belongs to a virtual node other than self virtual node and about the virtual node to which said IP address belongs, and which has been advertised from the node which corresponds to the interface of the other virtual node, and transmitting it to another node within self virtual node.

40.   (Currently Amended) The node according to Claim 38, further comprising:

[[a]]means for gathering together and storing IP address information from other nodes within self virtual node;

[[a]]means for advertising the IP address information which has been gathered together by this gathering together and storing means to a node which corresponds to an interface of another virtual node;

[[a]]means for storing external IP address information, which is information about the IP address of another node which belongs to a virtual node other than self virtual node and about the virtual node to which said IP address belongs, and which has been advertised from the node which corresponds to the interface of the other virtual node; and

[[a]]means for offering the external IP address group information which has been stored in said storing means to said other nodes, according to requests from said other nodes.

41.   (Currently Amended) The node according to Claim 38, further comprising:

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[[a]]means for gathering together and storing IP address information from other nodes within self virtual node, and link cost information between said other nodes and self node;

[[a]]means for advertising the IP address information and link cost information which have been gathered together by this gathering together and storing means to a node which corresponds to an interface of another virtual node; and

[[a]]means for storing external IP address information, which is information about the IP address of another node which belongs to a virtual node other than self virtual node and about the virtual node to which said IP address belongs, and which has been advertised from the node which corresponds to the interface of the other virtual node, and link cost information from said node which corresponds to the interface of the other virtual node to said other node, in correspondence to the IP address of said other node, and transmitting it to another node within self virtual node.

42.   (Currently Amended) The node according to Claim 38, further comprising:

[[a]]means for gathering together and storing IP address information from other nodes within self virtual node, and link cost information between said other nodes and self node;

[[a]]means for advertising the IP address information and link cost information which have been gathered together by this gathering together and storing means to a node which corresponds to an interface of another virtual node;

[[a]]means for storing external IP address information, which is information about the IP address of another node which belongs to a virtual node other than self virtual node and about the virtual node to which said IP address belongs, and which has been advertised from the node which corresponds to the interface of the other virtual node,

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and link cost information from said node which corresponds to the interface of the other virtual node to said other node, in correspondence to said IP address of said other node; and

[[a]]means for offering the external IP address group information and the link cost information which have been stored in said storing means to said other nodes, according to requests from said other nodes.

43. (Currently Amended) The node according to Claim 38, further comprising:

[[a]]means for receiving a packet for checking reachability from another node within self virtual node;

[[a]]means for collecting together IP addresses of packets which have been received by said receiving means and generating internal IP address group information which is related to nodes within self virtual node;

[[a]]means for interchanging and harmonizing the internal IP address group information which has been generated by said generating means with other nodes which correspond to said interface within self virtual node and adjusting it appropriately, and synchronizing it as unified internal IP address group information for self virtual node; and

[[a]]means for advertising this internal IP address group information which has been unified by said synchronizing means to a node which corresponds to an interface with an other virtual node.

44. (Currently Amended) The node according to Claim 38, wherein said advertisement means comprise[[s]]:

[[a-]]means for deciding whether or not an advertisement path is present from an other node which corresponds to said interface within self virtual node to a node which corresponds to an interface with the same other virtual node; and

[[a-]]means for, when the decision result from said decision means is "yes", performing advertisement via any advertisement path of self node or of said other node to the node which corresponds to said interface of said other virtual node.

45.   (Currently Amended) The node according to Claim 38, further comprising:

[[a-]]means for receiving a packet for checking reachability from an other node within self virtual node;

[[a-]]means for summarizing the IP addresses of packets which have been received by said receiving means and generating internal address group information which is related to a node within self virtual node; and

[[a-]]means for advertising the internal IP address group information which has been generated by said generating means to the node which corresponds to the interface with the other virtual node.

46.   (Currently Amended) The node according to Claim 38, further comprising:

[[a-]]means for receiving from an other node within self virtual node a packet for checking reachability which includes information to the effect that self node is the one with the n-th cheapest link cost from the point of view of said other node;

[[a]]means for summarizing the IP addresses of packets which have been received by said receiving means and generating internal IP address group information which is related to a node within self virtual node for each of said n values; and

[[a]]means for advertising the internal IP address group information which has been generated by said generating means to the node which corresponds to the interface with the other virtual node.

47.   (Currently Amended) A node which constitutes a virtual node of level 1 in a layered network, ~~which has been defined by dividing up the nodes which make up the network into cells each made up from one or a plurality of said nodes and defining these cells as virtual nodes of level 1, so that these virtual nodes of level 1 constitute a virtual network of level 1, further dividing up these virtual nodes of level 1 which constitute said virtual network of level 1 into cells which are constituted by one or a plurality of virtual nodes, so as to constitute virtual nodes of level 2, and constituting a layered network by virtual networks of levels 1 through N which have been built up by performing the process of dividing into cells and making into virtual nodes in this manner once or a plurality of times, and by,~~ the layered network comprising virtual networks of a plurality of levels 1 through N, each of the virtual networks belonging to each level comprising one or a plurality of virtual nodes belonging to the each level, each of the virtual nodes serving as a cell, each cell comprising one or a plurality of nodes, a virtual node in a virtual network belonging to a lower level, which is a level other than the highest level, being a node in a virtual network belonging to a level higher than the lower level, if a link exists in said layered network which connects between different virtual nodes of the same level or of different levels, ~~defining~~ a node which corresponds to the point of contact between the interior of the virtual node upon this link and the exterior being [[as]] an interface, ~~so that,~~ and when the highest level virtual node to which said interface is related is of level M [[(]]where M≤N[[)]], said interface serving[[es]] as a

plurality of hierarchical interfaces of level 1 through level [[N]]M, comprising, if self node itself corresponds to said interface:

[[a]]means for advertising to a node which corresponds to an interface on the same level as self node link information about a link on the same level as self node which has been connected to self node and link cost information for said link; and

[[a]]means for receiving, from a node which corresponds to an interface on the same level with self node, advertisement of link information with a node which corresponds to said interface on the same level with self node, and link cost information for said link, and storing said information.

48. (Currently Amended) The node according to Claim 47, further comprising [[a]]means for, ahead of path computation, requesting and obtaining, from said node which corresponds to said interface, link information with a node which corresponds to an interface with the next highest level than self node, and link cost information for said link.

49. (Currently Amended) The node according to any one of Claims 27 through 29, wherein the source node ~~for path establishment~~ from which a path to the destination node is to be established comprises:

[[a]]determining means for ~~specifying~~ determining a virtual node to which ~~said~~ the destination node belongs, based upon~~from~~ the IP address of the destination node to which the path is to be established and~~for path establishment, based upon the~~ external IP address group information; and

[[a]]means for searching for a path from the source node to [[the]]a node which corresponds to [[the]]an interface [[of]]in the virtual node to which said destination node belongs which has been specified determined by said specifying the determining means, based upon link information of a link between a node which corresponds to an interface [[of]] in self virtual node[[,]] and a node which corresponds to an interface [[of]] in a virtual node on level 2 or higher level, and link cost information for [[said]]the link.

50.   (Currently Amended) The node according to Claim 49, further comprising:

[[a]] means for requesting and obtaining, from a node which corresponds to an interface of a virtual node to which said destination node belongs, link information for within said virtual node, and link cost information for said link; and

[[a]] means for searching for, in addition to the path which has been searched out by said means for searching out a path to a node which corresponds to an interface of a virtual node to which said destination node belongs, a path to said destination node from said node which corresponds to said interface, based upon link information which has been obtained by said requesting and obtaining means, and link cost information for said link.

51.   (Currently Amended) The node according to Claim 49, further comprising:

[[a]] means for requesting and obtaining, from a node which corresponds to an interface of a virtual node which is included in a path from self node to said destination node, link information for within said virtual node, and link cost information for said link; and

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[[a]] means for searching out a path within said virtual node which is included in the path from self node to said destination node, based upon said link information and said link cost information for said link which have been obtained by said requesting and obtaining means.

52.   (Currently Amended)   The node according to any one of Claims 27 through 29, wherein the source node from which a path to the destination node is to be established comprises:

means for determining a virtual node to which the destination node belongs, based upon the IP address of the destination node and external IP address group information; and

means for notifying the destination node of: information which specifies the level of a virtual node of the topmost level for which the computation of a path from the source node to a node corresponding to an interface in a virtual node on level 2 or higher level is possible; and information which specifies n paths having smaller link costs which have been searched from among paths from the source node to the mode corresponding to the interface in the virtual node on level 2 or higher level, based upon: information about a link between a node corresponding to an interface in self virtual node and the node corresponding to the interface in the virtual node on level 2 or higher level; and link cost information for the link, and

the destination node comprises means for searching out a path from the destination node to a node corresponding to an interface in the virtual node of the topmost level based upon the information which has been notified, and for notifying the source node of a path having the minimum link cost as a finally found path based upon combinations of the path from the destination to the node corresponding to the interface

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in the virtual node of the topmost level and n paths~~wherein the source node for path~~
~~establishment comprises:~~

~~a means for specifying a virtual node to which said destination node belongs~~
~~from the IP address of the destination node for path establishment, based upon the~~
~~external IP address group information; and~~

~~a means for notifying to the destination node to which a path is to be established~~
~~information which specifies on which level is the virtual node of the topmost level for~~
~~which path computation from self node to the node which corresponds to the interface is~~
~~possible based upon information about a link between a node which corresponds to an~~
~~interface of self virtual node and a node which corresponds to an interface of a virtual~~
~~node of level 2 or greater and link cost information for said link, and the result of~~
~~searching for a path from self node to the node which corresponds to said interface for~~
~~which the link cost is the lowest in order up to the n-th lowest;~~

~~and said destination node comprises a means for, along with searching out a~~
~~path from self node to the node which corresponds to the interface with the virtual node~~
~~of said topmost level for which path computation from said source node to the node~~
~~which corresponds to the interface is possible based upon said information which has~~
~~been notified, also combining said search results with the results of searching for a path~~
~~up to said n-th lowest one, and notifying the path for which the link cost is the minimum~~
~~to said source node as the final path which has been found~~.

53.   (Currently Amended)   The node according to any one of Claims 27, 36,
38, and 47, further comprising:

[[a]]means for referring to link information which has been stored in said storing
means and deciding whether or not a link which connects self virtual node and an other
virtual node is connected to self node;

[[a]]means for when, according to the decision result of this decision means, a link which connects self virtual node and an other virtual node is connected to self node, deciding whether or not self node corresponds to a termination point for a layer of an LSP which has been established over said link; and

[[a]]means for when, according to the decision result of this decision means, self node corresponds to said termination point, recognizing that self node is a node which corresponds to said interface, and exercising a function which corresponds to said interface.

54.   (Currently Amended)   The node according to any one of Claims 27, 36, 38, and 47, further comprising:

[[a]]means for observing the resource utilization state related to self node;

[[a]]means for, if, based upon the results of observation by this observation means, no room is available in the resources which are used for data transmission to another node within self virtual node and self node corresponds to said interface, along with exercising a function as a node which belongs to an other virtual node of level 1 to which self node is connected, also updating information about the virtual node to which self node belongs along with change of said associated virtual node;

[[a]]means for advertising the change of contents of this updating means; and

[[a]]means for, when a said advertisement has been received from an other node, updating the information about the virtual node to which self node belongs based upon said advertisement.

55.   (Currently Amended) The node according to any one of Claims 27, 36, 38, and 47, further comprising:

[[a]]means for observing the cost of a link which is related to self node;

[[a]]means for, if, based upon the results of observation by this observation means, the link cost which is used for data transmission to an other node within self virtual node is greater than a threshold value, and self node corresponds to said interface, along with activating a function as a node which belongs to an other virtual node of level 1 to which self node is connected, updating the information about the virtual node to which self node belongs along with change of said associated virtual node;

[[a]]means for advertising the updated contents which have been updated by this updating means; and

[[a]]means for, when a said advertisement has been received from an other node, updating the information about the virtual node to which self node belongs based upon said advertisement.

56.   (Previously Presented) A layered network comprising a plurality of nodes, each of the plurality of nodes being a node according to any one of Claims 27, 36, 38, and 47.

57.   (Original) A method for building a layered network according to Claim 56, wherein,

when, corresponding to a layer of an LSP which has been established in a link between self virtual node and another virtual node, a node which is endowed with a

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function of terminating an LSP of said layer has terminated an LSP of said layer, said node is established as a node which corresponds to said interface.

58. (Previously Presented) The method for building a layered network according to Claim 56, wherein, when there is no capacity in resources which are used for data transmission over links which have been established between nodes, said nodes are separated into different virtual nodes.

59. (Previously Presented) The method for building a layered network according to Claim 56, wherein

when the link cost for data transmission over links which have been established between nodes has exceeded a threshold value, said nodes are separated into different virtual nodes.

60. (Currently Amended) The network control device which controls the plurality of nodes which make up a layered network according to Claim 56, comprising [[a]]means for, when, corresponding to a layer of an LSP which has been established in a link between self virtual node and another virtual node, a node which is endowed with a function of terminating an LSP of said layer has terminated an LSP of said layer, establishing said node as a node which corresponds to said interface.

61. (Currently Amended) The network control device which controls the plurality of nodes which make up a layered network according to Claim 56, comprising [[a]]means for, when there is no vacant capacity in resources which are used for data

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transmission over links which have been established between nodes, dividing up said nodes into different virtual nodes.

62.   (Currently Amended)   The network control device which controls the plurality of nodes which make up a layered network according to Claim 56, comprising [[a]]means for, when the link cost for data transmission over links which have been established between nodes has exceeded a threshold value, dividing up said nodes into different virtual nodes.

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